

Mr. E. W. Rockburne for measuring the immature stages and for drawing pupal structures.

### Literature Cited

- EDWARDS, H. 1881. New genera and species of North American Noctuidae. *Papilio* 1: 19-28.
- HARDWICK, D. F. 1958. Taxonomy, life history, and habits of the elliptoid-eyed species of *Schinia* (Lepidoptera: Noctuidae), with notes on the Heliothidinae. *Can. Ent. Suppl.* 6.
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## DISTRIBUTION AND GEOGRAPHICAL DIFFERENTIATION OF *MARPESIA ELEUCHEA* HÜBNER (NYMPHALIDAE), WITH DESCRIPTIONS OF TWO NEW SUBSPECIES

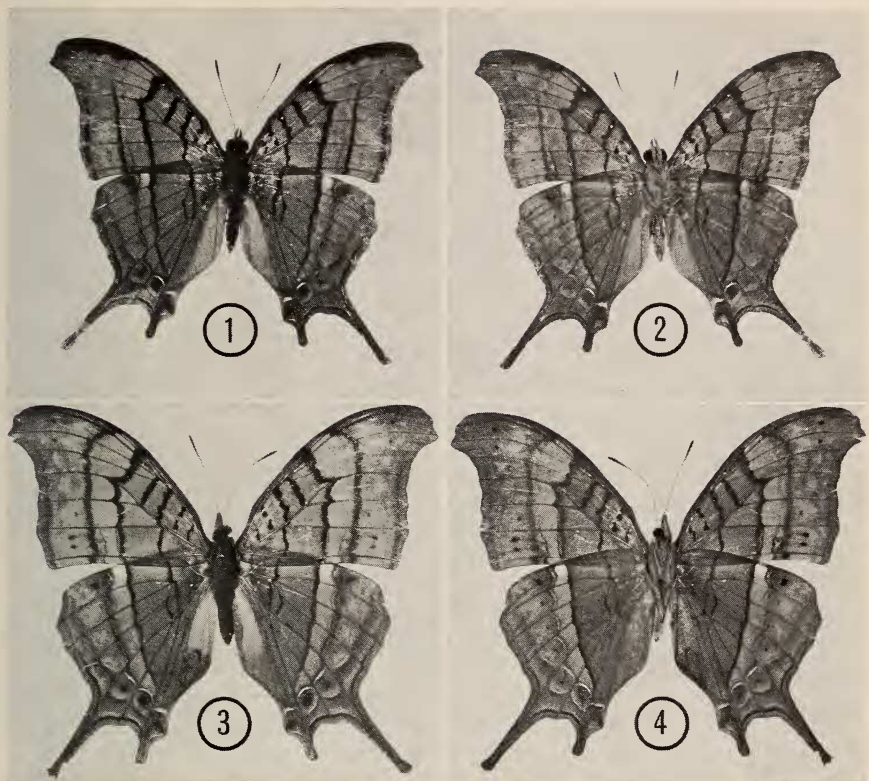
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The tailed butterfly *Marpesia eleuchea* Hübner appears, despite some doubtful continental records, to be an Antillean endemic. Records from the United States are based either on misidentified specimens of *M. petreus* (Cramer) (e.g., Slosson records from Miami) or on specimens of very doubtful provenance (e.g. the Doll specimen from "Central Florida" mentioned by Kimball (1965) and the "Southern States" specimen mentioned in the present paper). A record from Colombia discussed below is also highly suspect. The two species *M. eleuchea* and *M. petreus* are recognized by almost all authorities (e.g., dos Passos, 1964) as being distinct. Hemming's statement (1967, p. 277) that the two are currently treated subjectively as subspecies appears to be based on outdated information. Allowing for the wrong or questionable records noted above, the two are almost completely allopatric. *M. eleuchea* inhabits Cuba, Hispaniola, Jamaica and the Bahamas, whereas *M. petreus* has a mainland range extending from the southern United States far into South America, and also from Trinidad up the Lesser Antillean chain into the Virgin Islands and Puerto Rico, where *M. eleuchea* might have been expected but appears not to occur. There is a possible minor area of overlap in the Bahamas, where *M. eleuchea* occurs on New Providence and possibly other islands, while *M. petreus* is represented by a specimen in the British Museum (Natural History) labelled, "Bahamas, July 1921, J. M. St. J. Yates". However, it is not certain that the two species occur together on the same islands in the Bahama group.

This pattern of geographical replacement is of some evolutionary interest. The endemic West Indian *M. eleucha* is the most closely similar species to *M. petreus*, but is manifestly more primitive; for example the shape of the wings and the configuration of the forewing bands are less divergent from those of more normal nymphalids, and the ocellate spots are less degenerate. It is reasonable to suppose that it is a West Indian stage of evolution of the stock which on the mainland has developed into the more strongly apomorphic *M. petreus*. The latter, however, has been successful in invading the West Indies via the Lesser Antilles. These small islands do not have a significant endemic butterfly fauna, but are populated by species of three geographical categories. First there are widespread species, some of which, like *Battus polydamas* (Linnaeus), have developed endemic subspecies and some of which, like *Ascia monuste* (Linnaeus), have not. Second, there are Greater Antillean species which have spread southward down part of the Lesser Antillean chain. An example is *Heliconius charitonius* (Linnaeus), whose subspecies reach St. Kitts. Third, there are South American species which have moved northward into the lesser Antilles, usually without differentiation, like *Biblis hyperia* (Cramer), but occasionally with minor subspeciation, as in *Mestra cana* (Erichson). *M. petreus* is an extreme example of the latter type. Not only has it occupied the whole of the Lesser Antilles but it has spread through the Virgin Islands and Puerto Rico as well. When Antillean endemics that occur in Hispaniola are represented in Puerto Rico as well, the two populations are usually identical or at least very similar. It is most unusual for an unmodified continental vicariant to occur in Puerto Rico instead, as in the present case. It seems very likely that *Marpesia eleucha* originally inhabited Puerto Rico (and perhaps the Virgin Islands) as well as the other Greater Antilles, and that it has been displaced by competitive exclusion following the arrival of *M. petreus* from the south. An alternative hypothesis is that *M. eleucha* never occurred in Puerto Rico or died out there before the arrival of *M. petreus*, which penetrated this "empty" habitat but has so far failed to establish itself sympatrically with *M. eleucha* in Hispaniola.

It has been known for a long time that *M. eleucha* has significant geographical variation in the Antilles. Bates (1935, p. 172), for example, said of *M. eleucha*, "This choromorph is limited to Cuba and the Bahamas; specimens from Hispaniola and Jamaica (*pellenis* Godt) are less heavily marked." Some years ago when I was studying the biogeography of West Indian butterflies, the late Mr. William P. Comstock called my attention to the geographical variation of this species and indicated that Mr. C. F. dos Passos intended to work it out. At Mr. Comstock's sugges-



Figs. 1-4. *Marpesia eleuechea eleuechea* Hübner. 1, 2, ♂, Upper and under sides, Santiago de Cuba, F. E. Church, AMNH; 3, 4, ♀, upper and under sides, Santiago de Cuba, F. E. Church, AMNH.

tion, Mr. dos Passos kindly relinquished study of the problem to me and I set aside a type series of a manuscript subspecies from Hispaniola. The present paper describes that subspecies and another from the Bahamas, and compares these with the two named subspecies.

*Marpesia eleuechea eleuechea* Hübner

Figs. 1-4.

*Marpesia eleuechea* Hübner, 1818, p. 32, pl. [35], figs. 197, 198.

*Marpesia eleuechea*: Hübner, 1819, p. 47.

*Marpesia eleuechea*: Hübner [1823], pl. [50].

*Nymphalis eleuechea*: Poey, 1847, p. 47.

*Marpesia eleuechea*: Doubleday, 1844, p. 86. In part.

*Timetes (Marpesia) eleuechea*: Doubleday, Westwood and Hewitson, 1850, p. 263. In part.

*Timetes eleuechea*: Herrich-Schäffer, 1864, p. 161.

*Megalura eleuechea*: Gundlach, 1881, p. 112.

*Athena eleucha*: Dyar, 1902, p. 25. In part.

*Megalura eleuchea*: Seitz, 1914, p. 470.

*Athena eleuchea eleuchea*: Bates, 1935, p. 172. In part.

*Marpesia eleuchea*: Comstock, 1944, p. 462. In part.

*Marpesia eleucha*: dos Passos, 1964, p. 74. In part.

*Marpesia eleuchea*: Hemming, 1967, p. 277. In syn. *M. petreus* (Cramer).

*Male*. Forewing short, termen erect and with moderately produced subapical angle. Upperside fulvous, with three oblique black bars in cell, the second broken, the third produced to anal vein. A black bar on discocellular. Three black lines between cell and termen: the first oblique to  $M_3$ , there angled and erect to posterior margin; the second narrow, anteriorly faint and weakly curved; the third thick, a little diffuse, parallel to termen. Apical area infuscated.

Hind wing above similar in colour. A black line from costa to  $Cu$ , traversing cell. A bent, broken, black bar at end of cell. A narrow black postmedial line, erect from costa to  $Cu_2$ , there curving basad and fading out. Three subterminal bands. The first fuscous, diffuse, preceded on costa by a white shade and followed by a greyish apical shade, weakly converging with postmedial to  $M_3$ , there bent basad and scalloped to form basal edges of three large, grey, suffused, ocellate spots. The second subterminal band diffuse, fuscous, converging with the first from near apex to  $M_3$ , thence scalloped to form distal borders of ocellate spots. The third subterminal band narrower, better defined, close to and parallel to termen, forming a deep dentation into the tail. Anal area suffused with greyish fuscous, the suffusion not taking in all of the first ocellate spot. Tail white-tipped. Anal lobe blue-suffused.

Underside brown with violet tints, paler beyond middle, leaf-like. Forewing with first cell-band reduced, curved, brown. Second cell-band broken in middle. Third cell-band narrow, irregular, black, distally pale-edged. Discocellular bar grey, edged with fuscous powdering. Postmedial line light grey, followed by dark brown, forming the midrib of the leaf-like pattern. A complete series of poorly defined ocellate spots, bordered by weak, scalloped, brown, first and second subterminal lines. Third subterminal line following same course as on upperside, but very weak.

Hind wing beneath coloured like forewing. Pattern elements occupying same positions as above, but with a complete series of ocellate spots.

*Female*. Upperside like that of male, but much duller fulvous, lines thicker. Forewing and hind wing with suggestions of complete series of ocellate spots, defined outwardly by greyish-fuscous suffusion. Whole terminal area suffused with greyish or brownish fuscous. Apical suffusion of forewing brownish fuscous, not black.

Underside like that of male, but grey rather than brown.

*Type*. The type is, so far as I know, lost, but Hübner gives the locality Havana, Cuba.

*Material examined*. Eighty-three specimens, from Cuba: Rangel, P. del R.; Havana, June; Nueva Gerona, I. of Pines, Aug.; Santiago de las Vegas, July; Camagüey, April; Soledad, Sta. Clara, July; Matanzas, July; Santiago de Cuba, 200 ft., June; Torquino R., 100 ft. July; Sierra Maestra, 1000 ft., March, June; Loma del Gato, Sierra Maestra, 850 m., July; Guantánamo, June; Baracoa; Holguín; Río Cano, March; Tanamo, March; San Christobal. Two specimens labelled Guacomo, Colombia, F. E. Church, appear to belong to this subspecies.

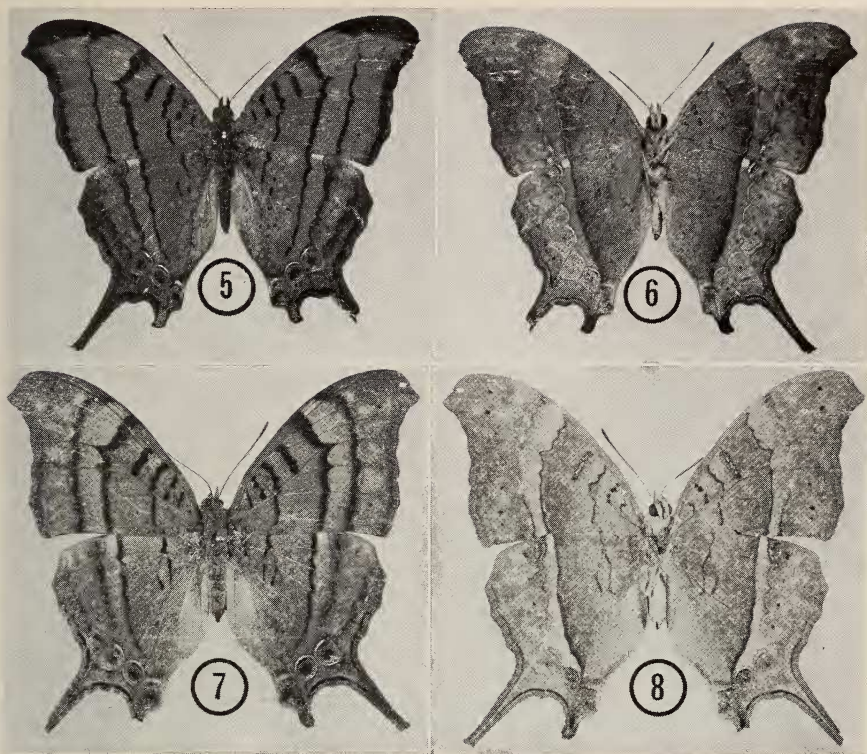
### ***Marpesia eleuchea bahamensis* Munroe, new subspecies**

Figs. 5-8

*Athena eleuchea eleuchea*: Bates, 1935, p. 172. In part.

*Male*. As in the nominate subspecies, with the following differences. Size a little smaller on average. Markings of forewing slightly heavier. Hind wing above with apex grey-suffused from first subterminal band to termen. Second subterminal band





Figs. 5-8. *Marpesia eleuchea bahamensis* n. subsp. 5, 6, Holotype, ♂, upper and under sides, Nassau, Bahamas, F. E. Taylor, BM (NH). 7, 8, allotype, ♀, upper and under sides, Nassau, Bahamas F. E. Taylor BM(NH).

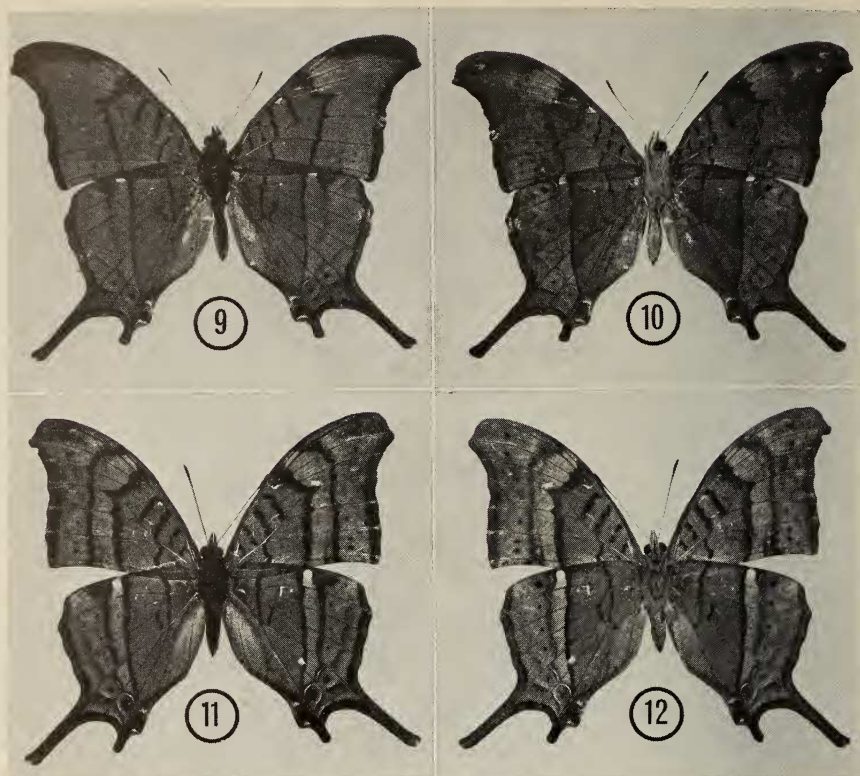
diffuse, with fuscous suffusion extending weakly distad to termen. Third subterminal line heavier. Anal area with greyish-fuscous suffusion more extensive, completely encompassing first ocellate spot as well as second and third. Basal margins of ocellate spots each with a strong white lunular marking. Some light-grey suffusion in outer parts of ocellate spots and in some specimen also along third subterminal band posteriad of tail.

Underside purplish grey, with weak markings.

*Female.* Larger and duller than male. Like female of the nominate subspecies, but with bands of forewing above heavier. Hind wing with more fuscous and grey suffusion and stronger white anal markings, as in male.

Underside light grey, with weak markings.

*Types.* Holotype, male, and allotype, female, Nassau, Bahamas, F. E. Taylor, In British Museum (Natural History). Three male and 3 female paratypes in the British Museum (Natural History) from the Bahamas: [Andros?], N. Chamberlain; Nassau, J. L. Bonhote, F. E. Taylor; "Bahamas, 10.6.1900", Sir C. Carter. Four additional paratypes in the Museum of Comparative Zoology, Cambridge, Mass., from the Bahamas: Nassau, June; Andros, July; Arthur's Town, Cat. I., July. In the Carnegie Museum one paratype Blue Hills, Nassau, Jan.



Figs. 9-12. *Marpesia eleuehea dospassosi* n. subsp. 9, 10, Holotype, ♂, upper and under sides, Punta Arena, San Lorenzo, Rep. Dominicana, 24 June 1915, F3177. AMNH; 11, 12, allotype, ♀, upper and under sides, Pétionville, Haiti, 12 June 1930, F. E. Church, AMNH.

### ***Marpesia eleuehea dospassosi* Munroe, new subspecies**

Figs. 9-12

*Marpesia eleuehea pellenis*: Bates, 1935, p. 172. In part.

*Male*. Coloured like the nominate subspecies. Forewing above with subapical angle on the average more rounded and termen more shallowly curved and oblique. Postcellular continuation of the third cell-stripe tending to be displaced basad. Anterior part of postmedial band strongly thickened towards costa. First subterminal line faint posteriorly, nearly obsolete anteriorly. Apical black suffusion wide, continued around apex to join expanded outer subterminal band. The latter wide, black and reaching nearly to termen.

Hind wing above with discocellular bar tending to be weak. First postmedial line usually narrow and broken. Second postmedial line nearly obsolete anterior to  $M_2$ . Ocellate spot in cell  $M_3$  largely fulvous.

Wings below as in nominate subspecies but variable in colour, from grey through tan to dark brown.

*Female*. Upperside closely similar to that of the nominate subspecies, but with

terminal area more broadly and heavily suffused with brownish fuscous on forewing and hind wing.

Underside as in nominate subspecies, but with ocellate spots more distinct.

*Types.* Holotype, male, Punta Arena, San Lorenzo, Dominican Republic, 24 June 1915, F3177, in the American Museum of Natural History. Allotype, female, Pétionville, Haiti, 12 June 1930, F. E. Church, in the American Museum of Natural History. Five male, 3 female paratypes in the American Museum of Natural History, same data as holotype, and: La Romana, Dominican Republic, 14 Dec., G. N. Wolcott; Rio Macosia, 8 km. south of Las Matas, Dominican Republic, 5 July 1957, O. Cucurullo Jr.; Pétionville, Haiti, 3 June 1930, F. E. Church; Cit. La Ferrière, Haiti, 2,500 ft., 6 June 1935. Five male, 4 female paratypes in the British Museum (Natural History): "Haiti", Tweedie; Port-au-Prince, Haiti, F. Odile Joseph; "Gulf of Mexico, P. E. Cheesman"; [Haiti], ex coll. Chris. Ward. Five paratypes in the Cornell University Collection: Pétionville, Haiti, May, June; Monte Christi, Dominican Republic, June. Three paratypes in the Museum of Comparative Zoology, Cambridge, Mass.: "San Domingo".

### *Marpesia eleucha pellenis* (Godart)

Figs. 13-16

*Nymphalis pellenis* Godart, 1819, p. 359.

*Marpesia pellenis*: Doubleday, 1844, p. 86. In syn. of *M. eleucha*.

*Timetes (Marpesia) pellenis*: Doubleday, Westwood and Hewitson, 1850, p. 263.

In syn. of *T. eleucha*.

*Megalura eleucha*: Kaye, 1931, p. 533. In part.

*Athena eleucha pellenis*: Bates, 1935, p. 172. In part.

*Marpesia eleucha*: Comstock, 1944, p. 462. In part.

*Marpesia eleucha pellenis*: Avinoff and Shoumatoff, 1946, p. 280.

*Male.* Like *M. e. dospassosi* in colour. Forewing with subapical angle more acute and termen more strongly excavated than in other subspecies. Transverse lines finer. Postcellular continuation of third cell line displaced basad, very fine. Postmedial line moderately expanded towards costa. First subterminal line very weak, especially anteriorly. Third subterminal narrow, removed from termen, interrupted or nearly so between  $M_1$  and  $M_2$ . Apical patch extending to subapical angle, its posterior margin nearly straight, oblique.

Hing wing above with discocellular line weak or absent. Postmedial and first subterminal lines narrower than in *M. e. dospassosi*. First ocellate spot almost wholly fulvous. Third subterminal line narrow.

Underside as in *M. e. dospassosi*.

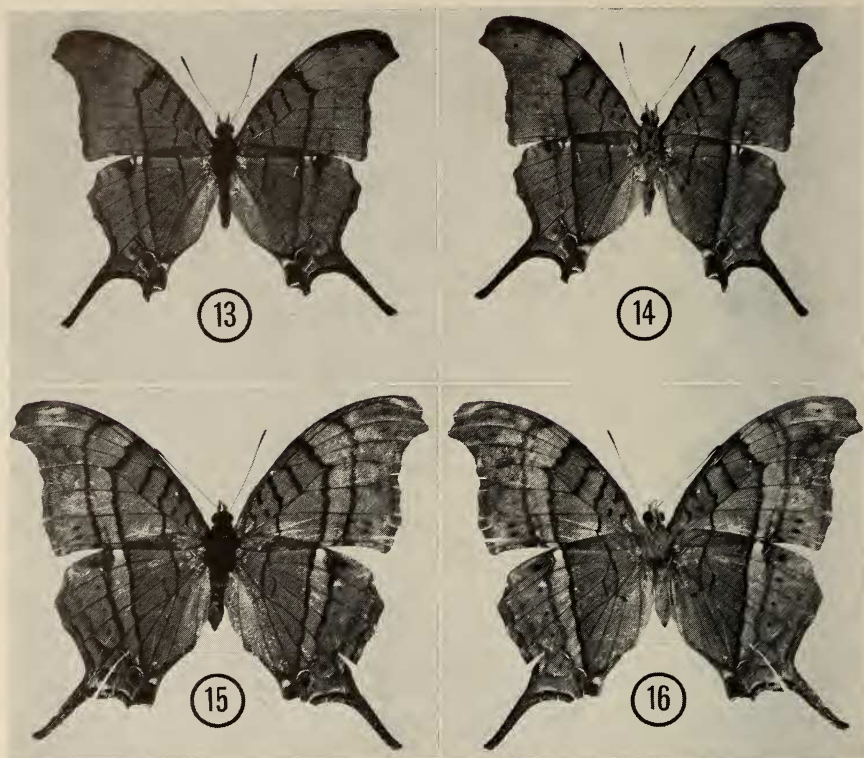
*Female.* Smaller and paler than the female of *M. e. dospassosi*. Transverse lines narrower than in other subspecies. Costal, apical and terminal suffusion of forewing and hind wing greatly reduced.

Underside as in *M. e. dospassosi*.

*Type.* Godart described *pellenis* from a specimen without exact locality, of which he said, "Nous la soupçonnons des Antilles." The material studied by Godart came from several collections, and though I think it doubtful that his type still exists it is possible it may yet be discovered. I therefore refrain from designating a neotype. His description refers to the absence of the third black line, i.e., the first subterminal, which would point to either this subspecies or the preceding one, but does not give any hint as to which of the two Godart had. I consider that he is as likely to have received a Jamaican specimen as one from Haiti, and I therefore arbitrarily restrict the type locality to Jamaica, making the name applicable to the present subspecies.

*Material Examined.* Thirty specimens from Jamaica: Montego Bay, May; Baron Hill, Trelawny, 1,150 ft., Aug., Sept., Oct., Nov.; Reading, St. James; Hope Botanic





Figs. 13-16. *Marpesia eleucea pellenis* (Godart). 13, 14, Male, upper and under sides, Hope Botanic Gardens, St. Andrew, Jamaica, 5 Dec. 1919, F4455, AMNH; 15, 16, ♀, upper and under sides, Baron Hill, Trelawny, Jamaica, Nov. 1935, AMNH.

Gardens, St. Andrews; Fish River, Portland; Constant Spring, 650 ft.; Rae Town, Aug.; Albion, July; Milk River, June. Also one specimen without locality, and one labelled "Southern States, No. 1442, Coll. J. Angus, West Farms, New York."

### Acknowledgments

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mounted the plates. Mr. E. C. Pelham-Clinton gave prompt and helpful information on specimens in the Dufresne Collection in the Royal Scottish Museum, Edinburgh, and Dr. Pierre Viette verified the absence of type material in the Muséum d'Histoire Naturelle, Paris.

### Literature Cited

- AVINOFF, A., AND N. SHOUMATOFF. 1946. An annotated list of the butterflies of Jamaica. *Ann. Carnegie Mus.* 30: 262-295.
- BATES, M. 1935. The butterflies of Cuba. *Bull. Mus. Comp. Zool.* 78: 63-258.
- COMSTOCK, W. P. 1944. Insects of Porto Rico and the Virgin Islands. *Lepidoptera Rhopalocera*. New York Acad. Sci., Sci. Surv. Porto Rico and the Virgin Is. 12: 419-622.
- DOS PASSOS, C. F. 1964. A synonymic list of the Nearctic Rhopalocera. *Lep. Soc. Mem.* 1.
- DOUBLEDAY E. 1844. List of the specimens of lepidopterous insects in the collection of the British Museum. Part 1. London.
- DOUBLEDAY, E., J. O. WESTWOOD and W. C. HEWITSON. 1850. The genera of diurnal Lepidoptera. Signature 4A. London.
- DYAR, H. G. 1902. A list of North American Lepidoptera. *U.S. Natl. Mus. Bull.* 52.
- GODART, J. B. 1819. In Latreille and Godart, *Papillon*, *Encyc. Méth., Hist. Nat.* 9. Paris.
- GUNDLACH, J. 1881. Contribución á la entomología cubana. I. *Lepidoptera*. Havana.
- HEMMING, F. 1967. The generic names of the butterflies and their type-species (*Lepidoptera: Rhopalocera*). *Bull. Brit. Mus. (Nat. Hist.), Ent. Suppl.* 9.
- HERRICH-SCHÄFFER, G. A. W. 1864. Die Schmetterlingsfauna der Insel Cuba. *Correspbl. Zool.-Min. Ver. Regensburg* 18: 159-172.
- HOLLAND, W. J. 1916. The Lepidoptera of the Isle of Pines [etc.] *Ann. Carnegie Mus.*, 10: 487-518, pl. 31.
- HÜBNER, J. [1818] *Zuträge zur Sammlung exotscher Schmettlinge*. Vol. 1, text, validating Vol. 1, pl. [35], [1814-18].
- HÜBNER, J. [1819]. *Verzeichniss bekannter Schmettlinge*. Signature 3, Augsburg.
- HÜBNER, J. [1823]. *Sammlung exotischer Schmetterlinge*. 2, pl. [50]. Augsburg.
- KAYE, W. J. 1931. Additions and corrections to the author's "Butterflies of Jamaica (1926)." *Trans. Ent. Soc. London* 79: 531-537, pl. 39.
- KIMBALL, C. P. 1965. The Lepidoptera of Florida, an annotated checklist. Gainesville.
- POEY, PH. 1947. Catálogo metódico y descriptivo de las mariposas de la isla de Cuba. *Mem. Real Soc. Economica, Habana* 3: 44-50.
- SEITZ, A. 1907-1924. The Macrolepidoptera of the World. V. The American Rhopalocera. Stuttgart.